

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

*In the Matter of*

Wireless Broadband Task Force  
Request for Public Comment  
On Issues Related to Commission's  
Wireless Broadband Policies

GN Docket 04-163

**REPLY COMMENT OF TROPOS NETWORKS**

Tropos Networks, headquartered in Sunnyvale, California, submits this Reply Comment in response to the Commission's Wireless Broadband Task Force request for public comment on issues related to the Commission's wireless broadband policies.

Tropos technology delivers city-wide mobile broadband access via a scalable, reliable and secure Wi-Fi infrastructure. The heart of the Tropos solution is a new class of product called a Wi-Fi cell, which layers patented routing intelligence on top of standard 802.11 to form an economical, self-configuring and self-healing wireless broadband data network that forwards client data through a mesh along the highest throughput path to a wired network. The result is a high performance, large scale Wi-Fi deployment with high throughput that doesn't require wired backhaul to each access point, installer truck rolls nor expensive and complex client devices and software. A Tropos system can be deployed at a multi-square-mile scale in a matter of days, providing an outdoor mobile broadband experience that is indistinguishable from indoor wireless and wired experiences.

Tropos patented technology maximizes throughput from client to server, eliminates the need for per node wiring and dynamically self-organizes as nodes are added or subtracted, backhaul supplied or removed, and interference comes and goes. The result is unprecedented bandwidth on the street, easy and low cost installation and operation, and true metro-scale coverage. Tropos products are providing a range of service providers and public safety agencies with the benefits of metro-scale Wi-Fi networks. Wireless broadband networks using Tropos technology are now operational in a myriad of varying environments ranging up to 16 square miles. Specific cities include Chaska, Minnesota, North Miami Beach, Florida, New Orleans, Louisiana, San Mateo California and Cerritos, California.

The dense cell architecture that is the underpinning of these networks enables true broadband. Internet access as well as mission-critical broadband applications in mobile public safety environments, such as mobile database access, video surveillance, and GIS inquiries are a reality. Without any special client technology, Tropos products have been successfully deployed in cellular mesh networks to deliver up to 11 Mbps data rates with 99% coverage over multiple square miles.

Tropos' mesh network is premised on principles similar to those on which the Internet is based. The technology enables a self organizing system allowing nodes to be added or subtracted, a feature that remedies faults in backhaul or interference that are encountered. Any laptop or other device with Wi-Fi capability can connect to the network of antennas and stay connected even while the user carries or drives the laptop

from place to place. The networks consist of Wi-Fi cells mounted on street lamps and telephone poles.

Tropos products, encompassing dense cells and mesh, will benefit any radio technology by bringing about enormous efficiencies in transmission and delivery. The result is a critical contribution to innovation and competition in the broadband marketplace and emanates from reducing dramatically backhaul costs and use of open standard radio. It presents a 20x better price performance than other mobile wireless broadband technologies. The result is a tangible and viable competitive choice to present broadband alternatives

The initial comments submitted to the Task Force reflect the range of interests surrounding wireless broadband. Owners of licensed spectrum advocate restraint with regard to unlicensed endeavors, with unlicensed service providers pleading for greater access and better spectrum. Tropos submits this reply comment based on its experience in designing and implementing its technology and the objective of promoting innovation, competition and economic growth in the telecommunications sector by making broadband more accessible and affordable.

By leveraging consumer electronics and enterprise production volumes, wireless broadband using unlicensed spectrum and mesh based micro cells will provide ubiquitous metropolitan area coverage at more affordable prices. It provides more pervasive access to the Internet; Chaska, Minnesota's Wi-Fi project is offering residential broadband Internet access at \$15.99 per month, with no contract required. Wireless broadband presents capability includes sending and receiving video and voice. Implementing the

technology does not require installing a vast new infrastructure. There are no zoning ordinance encroachments nor are new towers required. The complete infrastructure does not have to be completed before the network can commence operations. The network can be modified to meet changes in requirements very economically. Existing client radios are leveraged providing pervasive choice to the client and reducing costs.

Wireless broadband is not new, yet its evolution of being capable of transmitting video, voice and data at enormous speeds to a device of the consumer's choosing is a technological breakthrough. The Commission can promote productivity, competition and economic growth in the telecommunications sector by pursuing expeditiously three fundamentals. The first is affording wireless broadband reasonable access to already built infrastructure. The second is additional unlicensed spectrum allocation below one gigahertz. The third is recognizing the broader parameters wireless broadband may operate within while respecting spectrum use by other services.

## **INFRASTRUCTURE ACCESS**

Wireless broadband requires the deployment of antennas in small boxes, small enough that they can be attached to a platform such as a streetlamp pole or a utility pole. The fundamental characteristics of wireless signal propagation in delivering the higher speeds enabled by wireless broadband requires a higher density of smaller cells as compared to cellular networks. Wireless broadband needs access to these platforms so that its service is available. The Commission should pursue and advocate policies and actions ensuring that no one exercises control over these platforms to prevent the deployment of wireless broadband services.

## **SPECTRUM ACCESS**

Tropos wireless broadband today uses unlicensed spectrum although Tropos products can operate in both licensed and unlicensed environments. While not requiring a license to transmit over the airwaves, unlicensed users do not have exclusive use of the spectrum. The equipment used must comply with the technical requirements that minimize the amount of signal interference potential to other services. Two fundamental challenges face wireless broadband in terms of spectrum management policies.

The first is that many if not all of the narrow unlicensed spectrum bands are already too congested. The range of consumer devices such as cordless phones and garage door openers is varied and pervasive. Relegating the capability of wireless broadband to these presently crowded spectrum bands will stymie significantly its full potential. Additional spectrum committed to unlicensed wireless broadband communications is critical.

More fundamentally, the current unlicensed spectrum allocations are at high frequencies. Waves at lower frequencies are longer in length. Longer length waves hold their energy over long distances and also bounce around physical objects such as buildings. These longer waves are the ideal for wireless broadband, just as they were the ideal for the original allocation for broadcast television. The waves also encompass the capability to carry tremendous amounts of information. In these bands, wireless broadband can deliver very high bit rates at lower cost.

If costs are ignored, varying frequency bands can be used for the different kinds of wireless business. But cost has a tangible negative impact. It delays and hinders the rollout of services and embeds additional costs on consumers for many years. With high speed broadband access a national priority, with its recognized ability to generate economic growth, the lower the frequency assigned for wireless broadband the greater the ability of more millions of citizens to have not only broadband access but a competitive choice.

New spectrum is scheduled to become available in the 700 MHz band as a result of the television broadcast transition to a digital format. This is ideal spectrum for wireless spectrum. Its excellent propagation characteristics will allow the build out of inexpensive and ubiquitous wireless broadband networks. The faster the television digital transition is expedited, which is linked to the number of households that have access to digital capability, the sooner a portion of the 700 MHz spectrum can be made available for competitive broadband access to all Americans. The Commission should embrace fully the proposal it presently has under consideration that will include households with satellite and cable access in determining the penetration of digital television. It should allocate a portion of this 700 MHz spectrum for unlicensed wireless broadband.

Additionally, the Commission should bring to resolution its recent proposal to allow unlicensed spectrum devices to operate in the TV Broadcast spectrum at locations and at times when the spectrum is not being used. This proposal recognizes the innovations and capability of wireless devices to coexist in such an environment with

broadcast and other services. The Commission should adopt a rule embodying this premise.

## **RECOGNIZING BROADBAND WIRELESS CAPABILITY**

Wireless broadband is at the forefront of enormous engineering innovation and advances. It presents to the Commission much broader parameters for which to examine and establish rules to ensure that varying users and services can coexist. Tropos architecture has demonstrated capability to overcome a range of challenges presented by propagation and interference in real time. Additionally, Tropos uses state of the art security capability whose operation is decoupled from the spectrum in which a particular device runs. It leverages the inherent intelligence of its Wi-Fi cells through combining the most vigorous Internet security techniques to offer a robust and multi layered security framework that can be efficiently and effectively upgraded. It is premised on confronting and deterring the committed hacker who is not be deterred from pursuing disruption and invasion of either unlicensed or licensed networks.

By recognizing the unique and innovative direction of wireless broadband technology, the Commission will provide a much broader opportunity for the rollout of broadband than historic concepts present. It will make a tangible and meaningful difference in bringing about competitive broadband access to all Americans.

## **SUMMARY**

The Commission's efforts in promoting wireless broadband access are to be commended. Affording reasonable access to infrastructure, providing unlicensed

broadband technologies use of the 700 MHz spectrum band, making that spectrum available expeditiously and recognizing the innovation in capability and coexistence with other spectrum users wireless broadband presents will promote an environment that will spur substantial economic growth through competition and innovation in the telecommunications sector.

Respectfully submitted,

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